

In the Office Action the Examiner has rejected claims 17-24 under the non-statutory type double patenting doctrine as being unpatentable over claims 1-8 of the parent application U.S. Patent No. 6,212,210. The Examiner contends that although the claims are not identical, because the claimed invention and the patented invention provide a circuit for stabilizing of an optical wavelength from a laser element.

Although Applicant respectfully disagrees with the Examiner's contentions regarding the double patenting rejection, a Terminal Disclaimer is filed herewith in order to expedite the prosecution of this application. As such, Applicant respectfully requests that the double patenting rejection be withdrawn.

Enclosed with this Amendment, Applicants have also submitted a Supplemental Information Disclosure Statement including five references contained in a Search Report issued by the European Patent Office. According to the Search report two of the references are of particular relevance.

The first prior art reference, namely U.S. Patent No. 4,583,228, teaches an apparatus including a semiconductor laser source and means for stabilizing the frequency of a laser by producing an electrical feedback signal proportional to the output frequency of laser diode 10, at the output of a differential amplifier 21, as illustrated in Fig. 1 This feedback signal is simultaneously coupled to two feedback loops. The first loop 22 feedbacks relatively fast changes in the laser output frequency to a current control circuit 11 for driving the laser diode 10, through a high pass filter 24, gain adjustment element 25 and a switch 26. The second loop 23 feedbacks relatively slow change in the laser output frequency to a feedback heater 13 for controlling the temperature of the laser diode 10, through a low pass filter 27, a gain adjustment

element 28 and a switch 29.

In Fig. 3 and column 4, line 11 to 36 of the '228 patent both the switches are opened during the time interval t_1 to t_2 just after the laser diode was actuated, thereby permitting the laser to run freely. At time t_2 , the feedback loop 23 also starts to work. Then at t_3 the feedback loop 22 starts to work, such that after t_2 both the feedback loops 22 and 23 are working in parallel.

Switches 26 and 29 are used to close the loops 22 and 23, respectively. The '228 patent monitors only one control parameter and then separates the monitored signal output from a monitor circuit into a high frequency and low frequency components in order to control the driving current and temperature of the laser diode in parallel.

The other prior art reference, namely U.S. Patent No. 5,553,087, teaches a laser diode with its frequency locked to the frequency of an absorption line of rubidium. A variable signal is produced, which varies depending upon fluctuations in the temperature and supply current I_o of a laser diode 10, from a photodiode 34 coupled to the output of a rubidium cell 20 to which emission of the light from the laser diode 10 is irradiated through a beam splitter 14 and a quarter wave plate 18. The output of the photodiode 34 is combined with the output of another reference photodiode 16 at a normalizing circuit 50 for generating a signal whose value corresponds to the ratio of the DC levels of the two input signals. The normalized output of the circuit 50 is then sent to switching circuit 52.

The switching circuit 52 also receives a square wave input from a digital dividing circuit 54 in order to divide the output signal from the normalizing circuit 50 into half cycles of an AC current having a saw-tooth profile, which is generated from a signal generator 36 to actuate a

Zeeman coil 38 of the rubidium cell 20. The output of the switching circuit 52 is supplied to an integrated circuit 58 for generating an error signal, for example, depending upon the difference between the value of the two half cycles. The error signal I_e is combined with the supply current I_o to cause the output frequency of the laser 10 to return to its pre-ordained reference value.

Neither the '228 patent or the '087 patent teach or suggest the elements claimed in the present invention and as such provide no grounds for a rejection of the pending claims.

For example, there is no teaching or suggestion in the '087 patent, which discloses a plurality of control circuits to output control signals for controlling the optical wavelength of the laser diode in different control modes, wherein each control mode is based on different control parameters representing external conditions that cause a wavelength variation. As described above, the '087 patent discloses a single control circuit (control mode), and as such is not relevant to the present invention as claimed.

Likewise, there is no teaching or suggestion in the '228 patent which discloses a plurality of control circuits to output control signals for controlling the optical wavelength of the laser diode in different control modes based on different control parameters. As discussed above, the apparatus of the '087 patent monitors only one control parameter and then separates the monitored signal output from the monitor circuit into two control signals in order to control the driving current and temperature in parallel which is not analogous to the present invention which among other things calls for a plurality of control circuits that provide output control signals generated based on different control parameters.


Applicants respectfully submit that the present invention as claimed in the amended claims is now in condition for allowance, the earliest possible notice of which is earnestly

solicited. If the Examiner feels that a telephone conversation would assist in the prosecution of this application he is directed to contact the undersigned at his convenience.

Respectfully Submitted

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